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## PATENT SPECIFICATION



Application Date: Jan. 25, 1939. No. 2531/39.

524,241

Complete Specification Left: Jan. 25, 1940.

Complete Specification Accepted: Aug. 1, 1940.

### PROVISIONAL SPECIFICATION

#### Improvements in Grinding Machines

We, EDWIN MASTERTON MORRIS, of The Woodlands, Tythe Barn Lane, Shirley, Birmingham, in the County of Warwick, and WILLIAM DUDLEY, of 58, 5 Scarborough Road, Walsall, in the County of Stafford, both Subjects of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to grinding machines of the floor-stand type in which the abradent wheel is mounted upon a horizontal power-driven spindle, the work being usually supported upon a rest or in 15 a suitable holder.

In connection with grinding machines, it is common practice partially to enclose the abradent wheel in a casing which collects the heavier abrasive particles and 20 cuttings thrown off, but when breathed into the lungs the lighter particles and other matter are equally injurious and at the present time all machines which are operated for more than a certain number 25 of hours per day require to have associated therewith some means for withdrawing the dust-charged air from the vicinity of the wheel.

The chief object of the present invention is to provide an improved construction of floor-stand grinding machine, and one which will afford the operator adequate protection against pulmonary injury.

30 According to one feature of the present invention, the abradent wheel is mounted upon a box-like stand containing a suitable filter and an extractor fan whereby air is drawn through said filter from the 35 vicinity of said wheel, the filtered air being returned to the atmosphere after passing through said fan.

The abradent wheel may be partially 45 encased in known manner, the interior of the wheel casing communicating with that of the box-like stand at the side of the filter which lies remote from the fan, or the inlet chamber of said stand may actually constitute the lower part of said 50 wheel casing.

According to a further feature of the invention, two or more abradent wheels are mounted side by side upon a box-like

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stand and are individually connected to a power shaft also mounted on said stand, 55 the latter containing an extractor fan driven from said power shaft and adapted to draw air into the interior of said stand from the vicinity of said wheels.

According to yet another feature of the 60 invention, the abradent wheel (or each wheel, if there are several) is mounted so as to be capable of adjustment towards or away from a fixed work-rest or work holder, and the or each wheel may be 65 driven through the medium of an adjustable pulley which is interlocked with the wheel in such a manner, that any adjustment of the wheel necessitated by a change in its diameter will also call for 70 an adjustment of the pulley whereby the peripheral speed of the wheel is maintained substantially constant.

In one arrangement according to the 75 present invention, the stand of the machine takes the form of a rectangular box built up of sheet-metal plates, which may or may not be secured to an internal frame of angle-section or other members.

The top of the box-like stand may be 80 flat, and upon the rear portion thereof are provided a pair of spaced bearings which carry a power shaft extending parallel to the rear edge of the stand.

Intermediate these bearings the power 85 shaft has mounted thereon a pair of pulleys, one of which is fixed to the shaft whilst the other is loose on, but located axially of, the shaft in known manner.

The fast pulley is adapted to be driven 90 from an overhead shaft by means of a belt which can be shifted to the loose pulley, by any suitable means, when it is desired to stop the machine.

At opposite sides of the fast-loose pulley 95 pair, and preferably adjacent the bearings aforesaid, the shaft has fixed thereon two driving pulleys, which are connected by means of short belts to two separate grinder units mounted on the front portion of the box-like stand.

Instead of the power shaft being driven 100 from a line shaft as aforesaid, a separate motor drive may be provided for the machine. In such a case the box-like stand may carry a motor whose armature

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spindle has an integral or other extension at each end, the driving pulleys aforesaid being fixed to these extensions.

These two grinder units are preferably arranged coaxial with one another, and each comprises a spindle on which is a pulley driven by one of the short belts aforesaid, a bearing being provided at each side of such pulley and the spindle being extended beyond one of these bearings to carry an abradent wheel.

The driving and driven pulleys associated with the short belts aforesaid may be of fixed diameter, but preferably the diameter of one or each of said pulleys is capable of adjustment, so that a variable-ratio drive is provided between the power shaft or motor and each of the grinder units.

In this connection, it is convenient to employ pulleys constructed in accordance with prior Patent No. 481,362, and in this case the adjustment of the pulleys may, if desired, be effected by the means described in the Specification of our co-pending Application No. 28968/38 (Serial No. 519,235).

Secured to the front edge of the box-like stand adjacent each of the wheels is a bracket which forms or carries a work-rest and, in order that the clearance between each wheel and its work-rest may be maintained constant as the wheel diameter diminishes owing to wear, means may be provided for adjusting each grinder unit in a direction from front to rear of the stand.

For example, the bearings associated with each wheel spindle may be split in a vertical plane, and each such bearing may be secured to an upstanding bracket, which is conveniently fabricated from angle-section and/or other members.

The base of each such bracket may be slidably mounted on a channel or other section rail disposed at right angles to the spindle axis and each pair of brackets may be connected together and acted upon by an adjusting screw. This adjusting screw may engage a nut on the member connecting the brackets, and may be fixed to a hand wheel which is rotatably mounted at the front of the stand. Alternatively the screw may be fixed to the connecting member and the hand wheel hub may act as the nut.

When a variable-ratio drive is provided between the power shaft or motor and the grinder units as aforesaid, it is preferred to provide means for ensuring that, as the diameters of the abradent wheels are reduced by wear, their rotational speeds are progressively increased in such a manner as to keep the peripheral speed of each wheel substantially constant.

For this purpose, the adjustable pulleys above referred to may be interlocked with the grinder units (whose positions relative to the work-rests will, of course, be determined by the diameters of the respective wheels at any given moment), so that no adjustment of the grinder units can take place without a corresponding adjustment of the variable-ratio drives thereto, and *vice versa*.

The interlocking in question may be effected either mechanically, or by electrical means such as form the subject of prior Patent No. 481,423.

Each abradent wheel may be partially enclosed in a casing so that only the part of its periphery adjacent the work rest is exposed, and if desired this casing may be extended rearwardly to enclose the belt drive from the power shaft. One or each side of the casing may be formed as or provided with a door or doors, so that access may be had to the wheel and/or other parts when required.

Beneath each wheel an opening is provided in the top of the box-like stand, the front portion of which thus constitutes part of the wheel casing.

When either grinder unit is in operation, abradent particles and cuttings from the work are thrown into this front portion of the box-like stand, at the bottom of which the heavier matter collects and from which it may be removed at intervals by way of a door or doors at the side or front.

A vertical partition connects the side walls of the stand and the interior of the latter is further sub-divided by a second partition disposed intermediate the two grinding units and extending from front to rear of the stand.

The stand thus contains four compartments, of which the two front ones serve as receptacles for the heavier waste matter in the manner aforesaid.

The two front compartments communicate with one another by way of a gap or aperture at the top of the intervening partition, and corresponding gaps or apertures place one of the rear compartments in communication both with the compartment in front of it and with the second rear compartment.

The first mentioned rear compartment contains a transverse baffle which extends downwards from the top of the stand and at the bottom of which is a gap or aperture.

In the space between this baffle and the rear wall of the compartment is arranged a suitable filter, which is disposed above the level of the gap or aperture at the bottom of the transverse baffle and below the level of the gap or aperture at the top

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of the partition between the two rear compartments.

The filter conveniently comprises a plurality of superposed strainer plates or 5 trays which may rest on ledges at the sides of the space aforesaid.

The second rear compartment contains an extractor fan, which is adapted, when 10 in operation, to draw the dust-laden air from the two front compartments over the transverse partition into the first-mentioned rear compartment, under the baffle aforesaid, and up through the filter which, of course, retains all injurious matter. 15

The fan outlet opens through the rear-wall of the stand, so that the filtered air is returned directly to the atmosphere.

The filter compartment may be provided with a door at the side or back 20 through which access may be had to the strainer elements for purposes of cleaning or replacement.

The fan may be driven from the power shaft or motor above it through the 25 medium of a belt or the equivalent, which latter passes over a driving pulley mounted either on an extension of the power shaft beyond one of the bearings therefore, or on one of the armature 30 spindle extensions; as the case may be.

Although a grinding machine having a pair of individually-driven wheels which has been described, it should be understood that the box-like stand may carry a 35 single grinder unit or three or more such units, and that a single stand may accommodate two or more filters and/or fans.

Dated the 24th day of January, 1939.

FORRESTER, KETLEY & CO.,

Chartered Patent Agents,

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Jessel Chambers, 88/90, Chancery Lane, London, W.C.2.

## COMPLETE SPECIFICATION

### Improvements in Grinding Machines

We, EDWIN MASTERTON MORRIS, of 40 The Woodlands, Tythe Barn Lane, Shirley, Birmingham, in the County of Warwick, and WILLIAM DUDLEY, of 58, Scarborough Road, Walsall, in the County of Stafford, both British Subjects, 45 do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

50 In connection with grinding machines, it is common practice partially to enclose the abradent wheel in a casing which collects the heavier abrasive particles and cuttings thrown off, but the lighter particles and other matter are equally injurious when breathed into the lungs, and at the present time all machines which are operated for more than a certain number of hours per day require 55 to have associated therewith some means for withdrawing the dust-charged air from the vicinity of the wheel.

The chief object of the present invention is to provide an improved construction of floor-stand grinding machine, and one which will afford the operator adequate protection against pulmonary injury.

A further object is to enable the performance of the abradent wheel or wheels to be readily ascertained.

A grinding machine according to the present invention has two abradent wheels mounted side by side upon a box-like 75 stand, the interior of said stand being

divided by partitions into two front compartments disposed one below each of said wheels and two rear compartments, one of which contains a filter and the other an extractor fan adapted to draw air through 80 said filter from said front compartments.

The abradent wheels may be partially enclosed in casings, whose interiors communicate with the adjacent front compartments of the box-like stand.

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Preferably the abradent wheels are individually connected to a power shaft also mounted on the box-like stand and each such wheel may be mounted so as to be capable of adjustment towards or away 90 from a fixed work-rest or work-holder.

Each wheel may be driven through the medium of an adjustable pulley which is interlocked with the wheel in such a manner that any adjustment of the wheel 95 necessitated by a change in its diameter will also call for an adjustment of the pulley whereby the peripheral speed of the wheel is maintained substantially constant.

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In order that our invention may be clearly understood and more readily carried into practice, we have appended hereunto drawings illustrating the same, wherein:—

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Figure 1 is a side elevation of a grinding machine constructed according to the present invention,

Figure 2 is a plan view of the same with the wheel cover broken away,

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Figure 3 is a view corresponding to Figure 1, but showing the machine in

section, and

Figure 4 is a section on the line 4—4 of Figure 3.

In the construction illustrated the stand 5 of the machine takes the form of a rectangular box built up of sheet-metal plates, which may be connected together or reinforced by internal angle-section or other members, such as are shown at 6.

10 The top 7 of the box-like stand 5 may be flat, and upon the rear portion thereof provided a pair of spaced bearings 8 which carry a power shaft 9 extending parallel to the rear edge of the stand 5.

15 Intermediate these bearings 8 the power shaft 9 has mounted thereon a pair of pulleys 10, 11 one of which is fixed to the shaft 9 whilst the other is loose on, but located axially of, said shaft in known 20 manner.

25 The fast pulley 10 is adapted to be driven from an overhead shaft by means of a belt 12 which can be shifted to the loose pulley 11, by any suitable means, when it is desired to stop the machine.

30 At opposite sides of the fast-loose pulley pair, and preferably adjacent the bearings 8, the shaft 9 has fixed thereon two driving pulleys 13, which are connected by means of short belts 14 to two separate grinder units mounted on the front portion of the box-like stand 5.

35 Instead of the power shaft 9 being driven from a line shaft as aforesaid, a separate motor drive may be provided for the machine. In such a case the box-like stand 5 may carry a motor whose spindle has an integral or other extension at each end, the driving pulleys aforesaid being 40 fixed to these extensions.

45 The two grinder units on the front portion of the stand 5 are preferably arranged coaxial with one another, and each comprises a spindle 15 on which is a pulley 16 driven by one of the short belts 14, a bearing 17 being provided at each side of the pulley 16 and the spindle 15 being extended beyond one of these bearings 17 to carry an abradent wheel 18.

50 The driving and driven pulleys 13, 16 associated with the short belts 14 may be of fixed diameter, but preferably the diameter of one or each of said pulleys is capable of adjustment, so that a variable-55 ratio drive is provided between the power shaft 9 or motor and each of the grinder units.

60 In this connection, it is convenient to employ pulleys constructed in accordance with prior Patent No. 481,362, and in this case the adjustment of the pulleys may, if desired, be effected by the means described in our prior Specification No. 519,235.

65 Secured to the front edge of the box-

like stand 5 adjacent each of the wheels 18 is a bracket 19 which forms or carries a work-rest and, in order that the clearance between each wheel 18 and its work-rest 19 may be maintained constant as the wheel diameter diminishes owing to wear, means may be provided for adjusting each grinder unit in a direction from front to rear of the stand 5.

70 For example, the bearings 17 associated with each wheel spindle 15 may be split in a vertical plane, and each such bearing may be secured to an upstanding bracket 20, which is conveniently fabricated from angle-section and/or other 80 members.

75 The base of each bracket 20 may be slidably mounted on a channel or other section rail 21 which is fixed to the stand top 7 at right angles to the spindle 15 85 and each pair of brackets 20 may be connected together as at 22 and acted upon by an adjusting screw 23. This adjusting screw 23 may co-operate with an internally threaded hole in, or a nut carried 90 by, the member 22 connecting the brackets 20, and may be fixed to a hand wheel 24 which is rotatably mounted at the front of the stand 5. Alternatively, the screw 23 may be fixed to the connecting member 95 22 and the hub 25 of the hand wheel 24 may act as a nut.

80 When a variable-ratio drive is provided between the power shaft 9 or motor and the grinder units as aforesaid, it is preferred to provide means for ensuring that, as the diameters of the abradent wheels 18 are reduced by wear, their rotational speeds are progressively increased in such a manner as to keep the peripheral speed 105 of each wheel 18 substantially constant.

100 For this purpose, the adjustable pulleys (13 and/or 16) may be interlocked with the grinder units (whose positions relative to the work-rests 19 will, of course, be 110 determined by the diameters of the respective wheels 18 at any given moment), so that no adjustment of the grinder units can take place without a corresponding adjustment of the variable-ratio drives 115 thereto, and *vice versa*.

120 The interlocking in question may be effected either mechanically, or by electrical means such as form the subject of prior Patent No. 481,423.

125 Each abradent wheel 18 may be partially enclosed in a casing 26 so that only the part of its periphery adjacent the work-rest 18 is exposed, and, if desired, this casing may be extended rearwardly, as at 27, to enclose the belt drive from the power shaft 9. One or each side of the casing 26 may be formed as or provided with a door or doors, so that access may be had to the wheel 18 and/or other 130

parts when required.

Beneath each wheel 18 an opening 28 is provided in the top 7 of the box-like stand 5, the front portion of which is thus 5 open to the interior of the wheel casing 26.

When either grinding unit is in operation, abradent particles and cuttings from the work are thrown into this front portion of the box-like stand 5, at the bottom of 10 which the heavier matter collects as at 29, and from which it may be removed at intervals by way of a door or doors 30 at the side or front.

A vertical partition 31 connects the 15 side walls of the stand 5 and the interior of the latter is further subdivided by a second partition 32 disposed intermediate the two grinding units and extending from front to rear of the stand 5.

The stand 5 thus contains four compartments, of which the two front ones 33, 34 serve, in the manner aforesaid, as receptacles for the heavier waste matter from the wheels 18 above them.

It will be understood that each of the 25 compartments 33, 34 is large enough to contain the whole of the adjacent wheel 18 in its disintegrated form, as well as the stock removed by grinding.

This enables the performance of a given 30 abradent wheel to be accurately determined. For example, at the end of the useful life of such wheel, the waste matter in the associated compartment may 35 be weighed and its metal content determined, the resulting figures allowing the efficiency of the wheel under test to be ascertained and thus facilitating selection of suitable wheels.

The front compartments 33, 34 communicate with one another by way of a gap or aperture 35 at the top of the intervening partition 32. This gap or aperture 35 does not extend as far back as the 45 transverse partition 31, and from its rear edge a baffle 36, having a gap or aperture 37 at the top thereof, is carried from side to side of one of the front compartments; for example, the compartment 34.

The adjacent rear compartment 38 communicates with the space 39 behind the baffle 36 and also with the second rear compartment 40 by way of gaps or apertures 41, 42 disposed, respectively, at the 55 bottom of the transverse partition 31 and at the top of the partition 32.

The rear compartment 38 contains a suitable filter 43 which is disposed above the level of the gap or aperture 41 at the 60 bottom of the transverse partition 31 and below the level of the gap or aperture 42 providing access to the second rear compartment 40.

The filter 43 conveniently comprises a 65 plurality of superposed horizontal strainer

plates or trays which may rest on ledges at the sides of the compartment 38.

The second rear compartment 40 contains an extractor fan 44, which is adapted, when in operation, to draw the 70 dust-laden air from the two front compartments 29 over the baffle 36 into the rear compartment 38, under the transverse partition 31 and up through the filter 43 which, of course, retains all injurious matter. 75

The fan outlet 45 opens through the rear wall of the stand 5, so that the filtered air is returned directly to the atmosphere.

The filter compartment 38 may be 80 provided with a door 46 at the side or back through which access may be had to the filter 43 for the purpose of cleaning or replacing the strainer elements.

The fan 44 may be driven from the power shaft 9 or motor above it through the medium of a belt 47 or the equivalent, which latter passes over a driving pulley 48 mounted either on an extension of the power shaft 9 beyond one of the bearings 8 therefor, or on one of the motor spindle extensions; as the case may be. 85 90

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:— 95

1. A grinding machine having two abradent wheels mounted side by side upon a box-like stand, the interior of 100 which is divided by partitions into two front compartments disposed one below each of said wheels, and two rear compartments, one of these latter containing a filter and the other an extractor fan 105 adapted to draw air through said filter from said front compartments.

2. A grinding machine according to Claim 1, wherein the abradent wheels are partially enclosed in casings whose 110 interiors communicate with the adjacent front compartments of the box-like stand.

3. A grinding machine according to Claim 1, wherein communication is provided between the two front compartments, and between the two rear compartments, by way of a gap or aperture at the 115 top of the intervening partition in each case.

4. A grinding machine according to 120 Claim 3, wherein one of the front compartments communicates with the adjacent rear compartment by way of a gap or aperture at the bottom of the intervening partition, the filter being disposed in said rear compartment between the level of said gap or aperture and the level of the gap or aperture giving access 125 to the second rear compartment.

5. A grinding machine according to 130

Claim 4, wherein the extractor fan is disposed in said second rear compartment and exhausts through the wall thereof.

6. A grinding machine according to 5 any of the preceding Claims, wherein the abradent wheels are individually connected to a power shaft also mounted on the box-like stand.

7. A grinding machine according to 10 any of the preceding Claims, wherein each abradent wheel is mounted so as to be capable of adjustment towards or away from a fixed work-rest or work-holder.

8. A grinding machine according to 15 Claim 7, wherein each abradent wheel is driven through the medium of an adjustable pulley which is interlocked with said wheel in such a manner that any adjustment of the latter necessitated by a 20 change in its diameter will also call for an adjustment of the pulley whereby the

peripheral speed of said wheel is maintained substantially constant.

9. A grinding machine according to Claim 7, wherein the bearings of each 25 wheel spindle are carried by upstanding brackets slidably mounted on the box-like stand for movement at right angles to said spindle, said brackets being connected together and acted upon by an 30 adjusting screw.

10. A grinding machine substantially as described with reference to, and as shown in, the accompanying drawings.

Dated the 17th day of January, 1940.

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London, W.C.2.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1940.

### FIG. I.

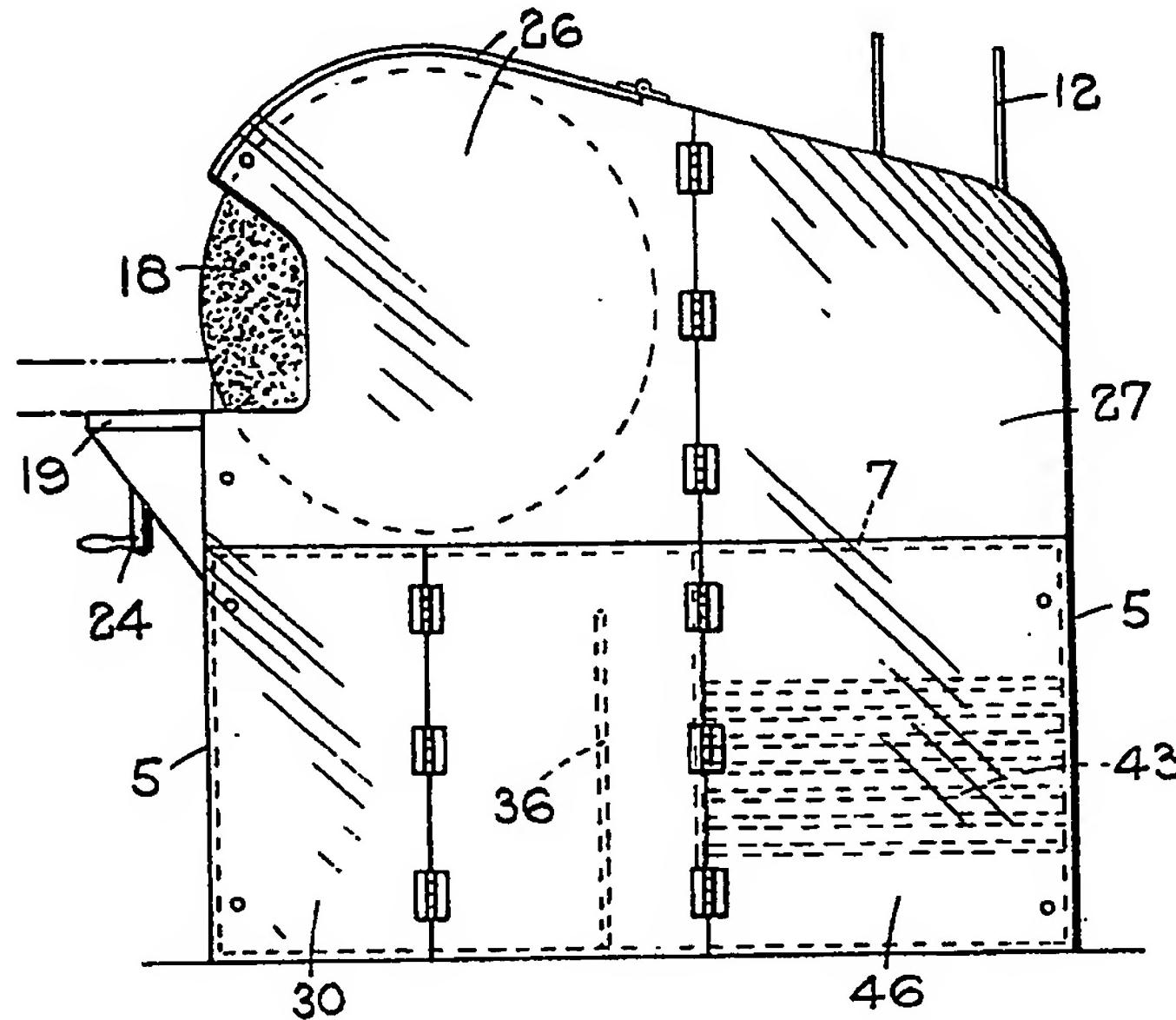
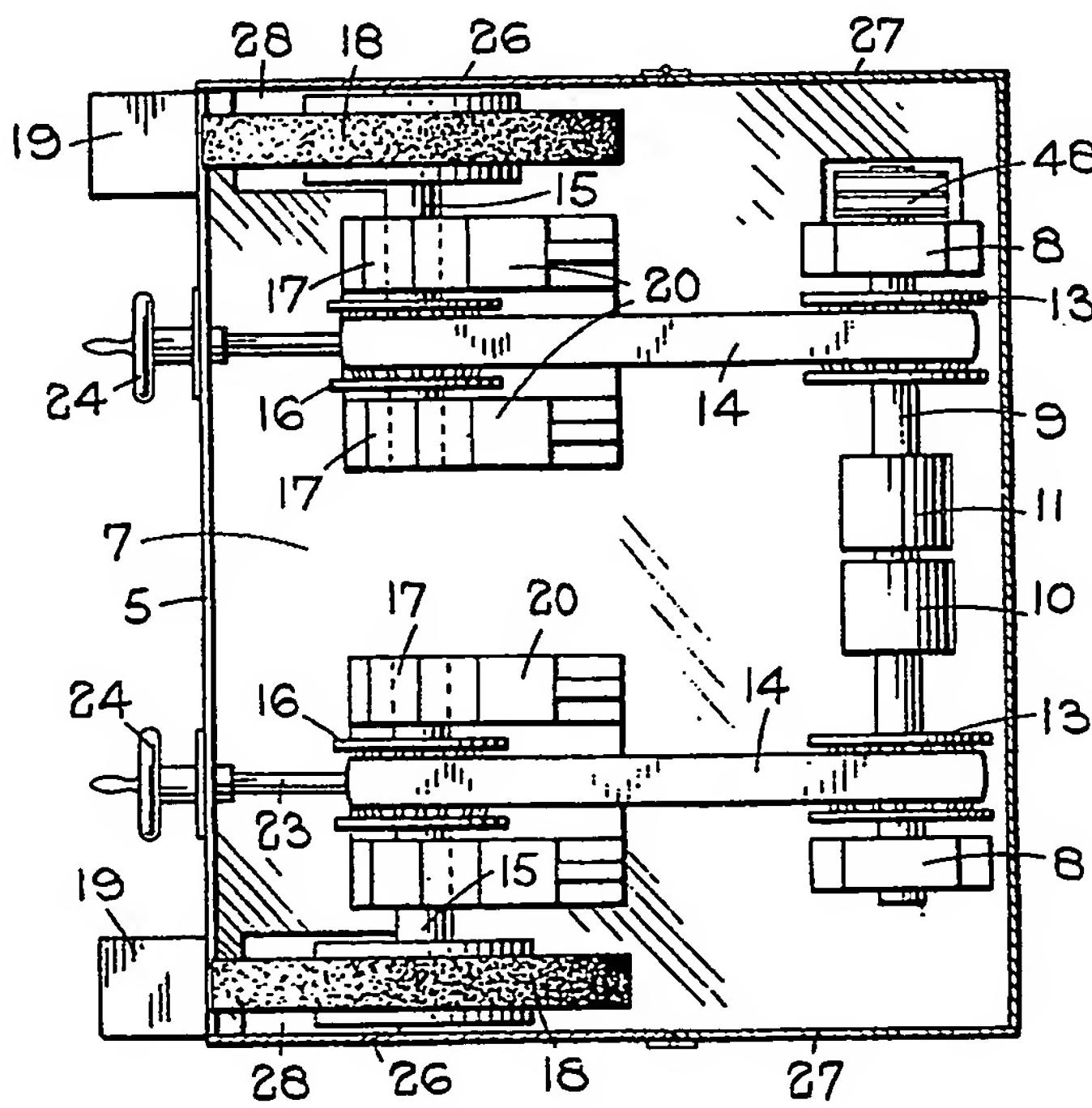


FIG. 2.



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SHEET 1

2 SHEETS  
SHEET 2

FIG. 3.

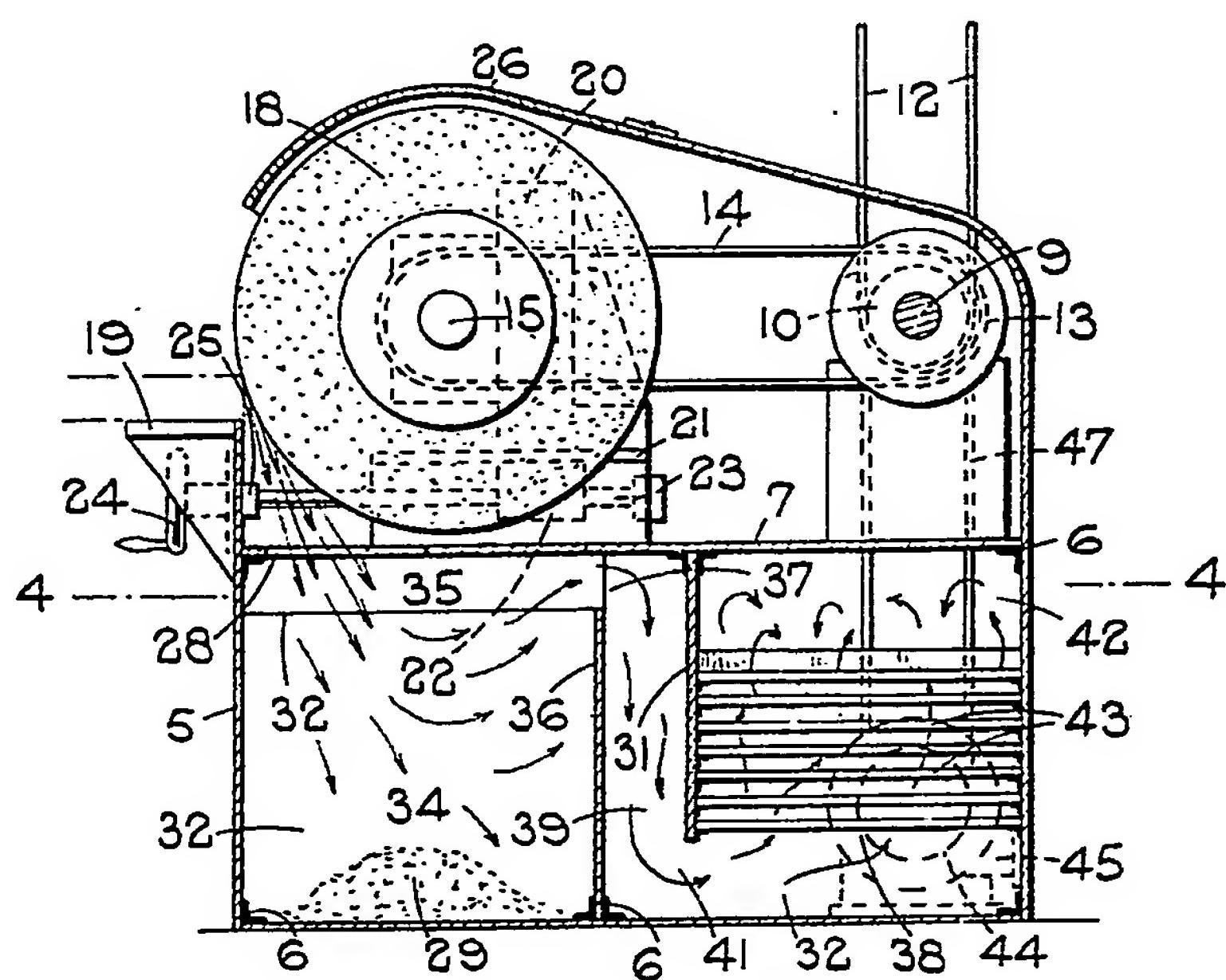
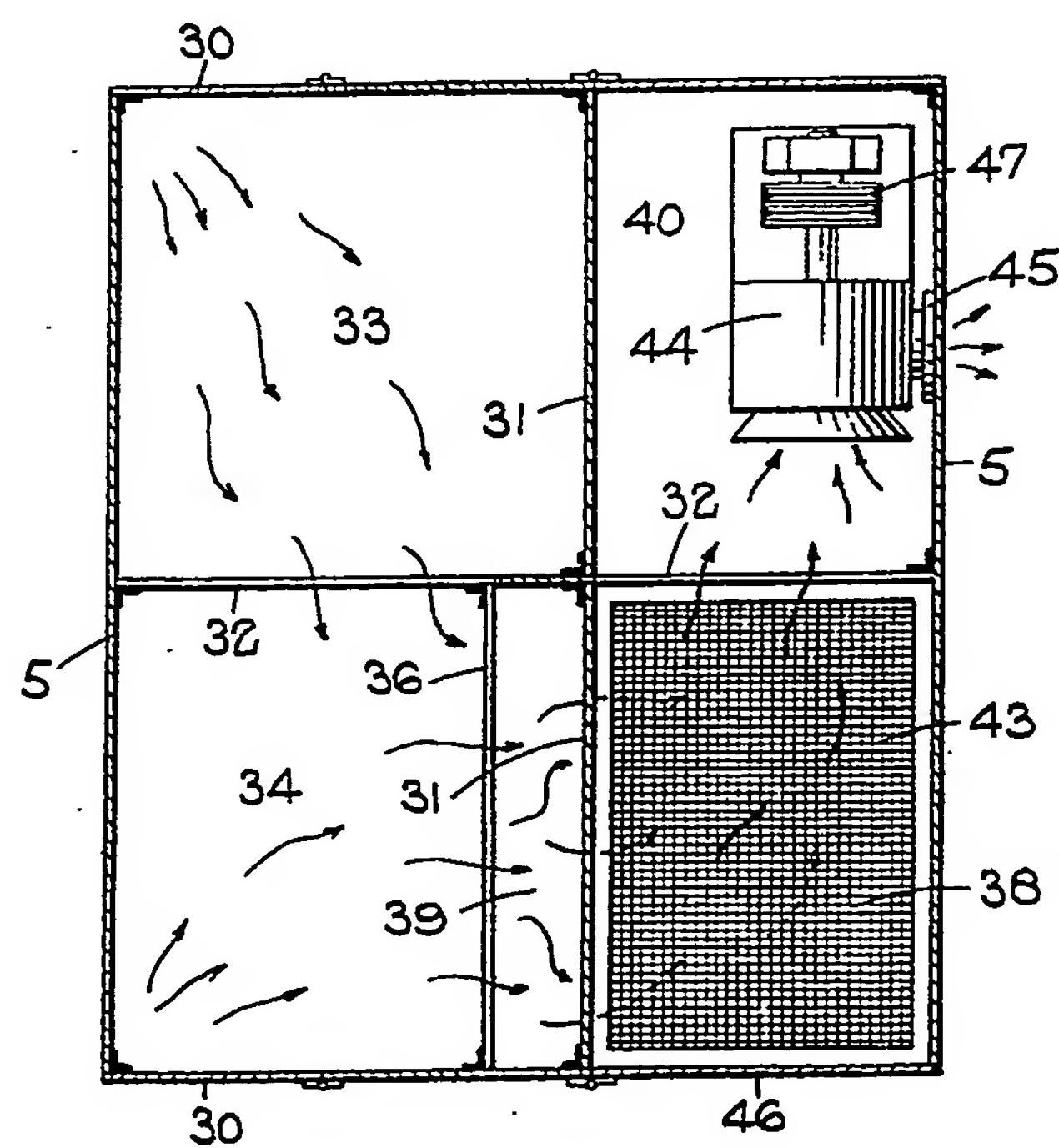


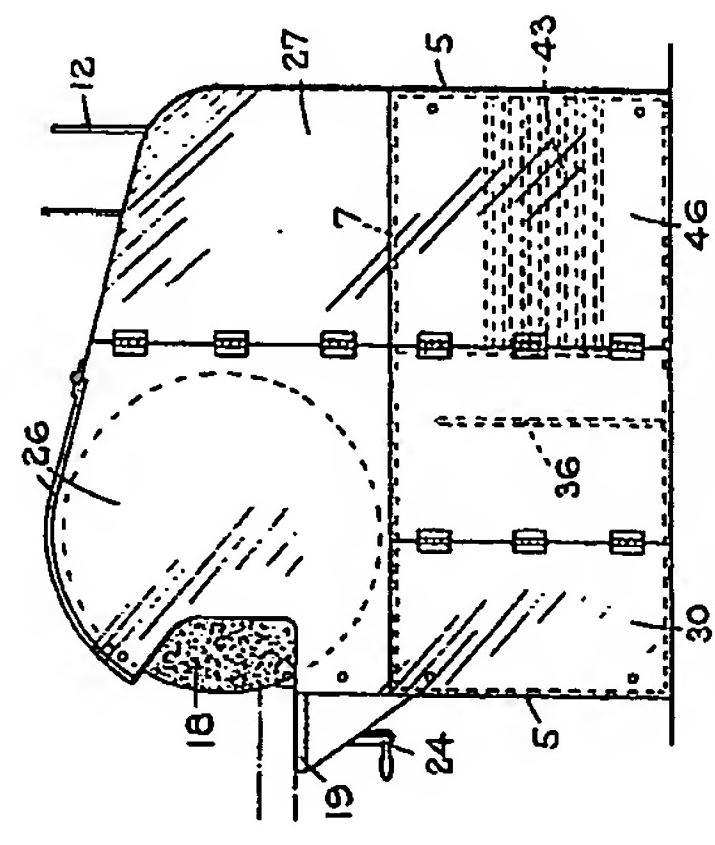
FIG. 4.



524,241 COMPLETE SPECIFICATION

SHEET 1

FIG. 1.



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SHEET 2

FIG. 3.

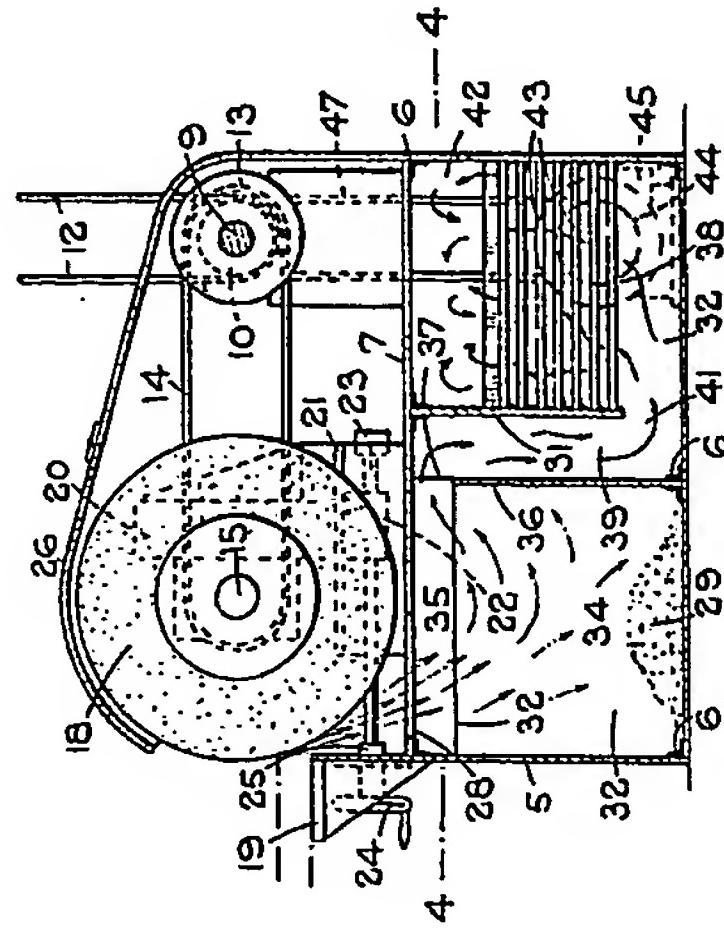


FIG. 2.

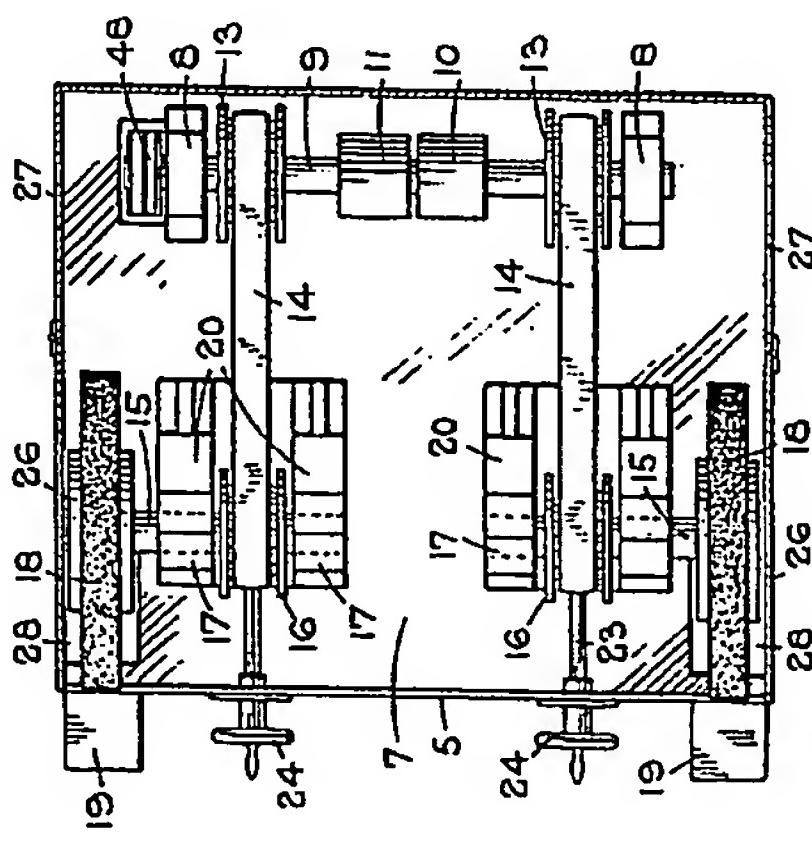
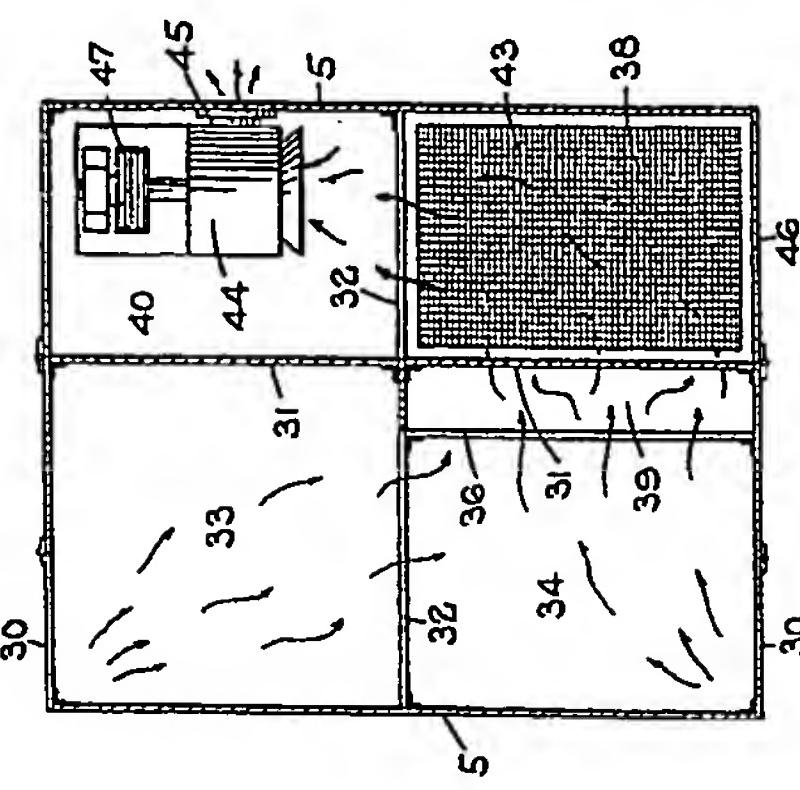


FIG. 4.



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